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ABSTRACT

There is an electric strike for a door or other movable barrier. The strike includes a housing with a striker plate movable between a locking position where the plate retains a latch tongue and an unlocked position at which the latch tongue is released. The striker plate has a pivoted lever with an outer end engagable with the housing to obtain the locking position and a latching lever with a shoulder means. The latching lever is displaceable by a solenoid between an aligned position of the shoulder means at which the pivoted lever is held at the locking position and one or more offset positions at which the pivoted lever is movable to the unlocked position.

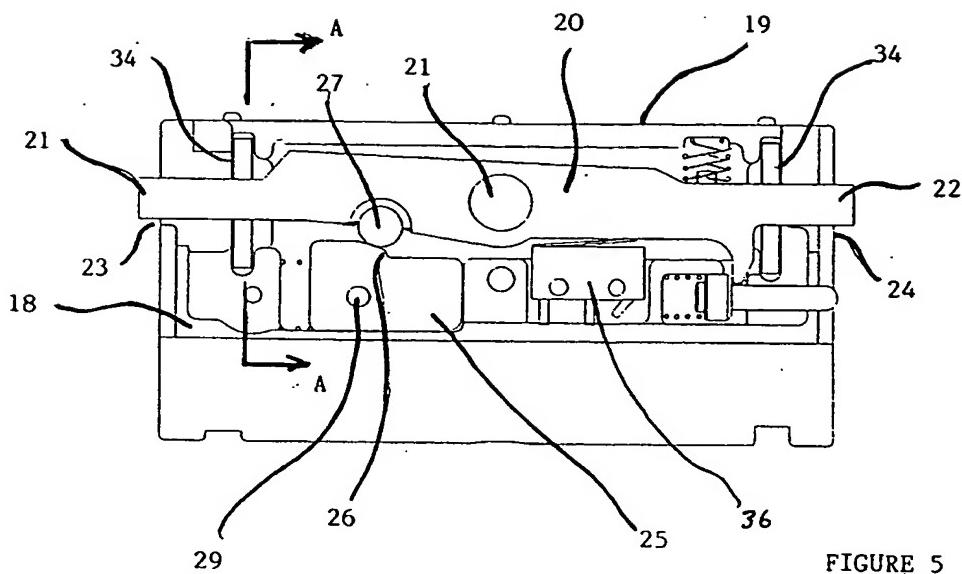


FIGURE 5

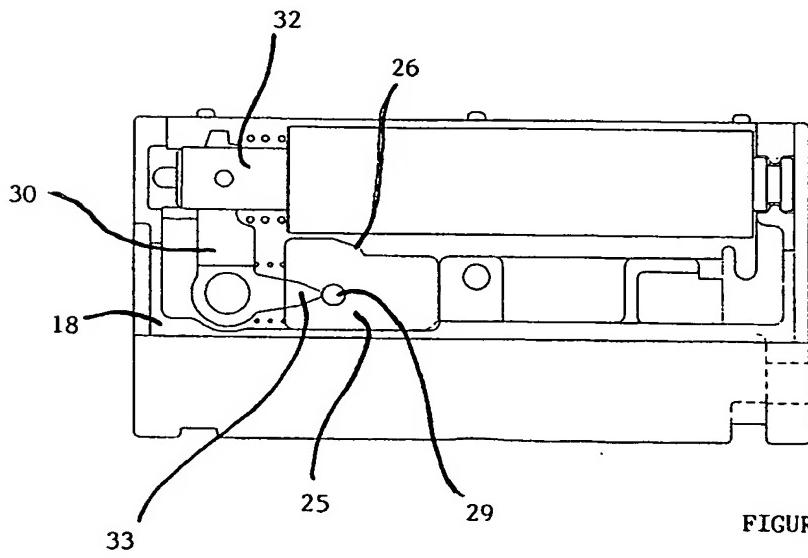


FIGURE 6

IMPROVEMENTS IN ELECTRIC STRIKES

BACKGROUND OF THE INVENTION

This invention relates to security locks. More particularly although not exclusively it discloses an improved electric strike for door latches.

Door latches having electric strikes are used in many security installations such as banks, hospitals and other commercial buildings. The doors are fitted with a latch tongue which in the locked position seats within a strike recess in the door frame. There is a striker plate which is pivoted between a locked position in which the tongue is held within this recess and an unlocked position at which the tongue is able to be pulled from said recess without retracting it. With existing devices however any side force applied to the locked door can jam the strike in the locked position. Also with existing locks change over from Power To Lock to Power To Open modes is difficult and in some cases impossible. Further, with existing strikes the lock mechanism for the striker plate is located in the housing which reduces the recess depth for the latch tongue and also the space available for sensors.

SUMMARY OF THE INVENTION

It is therefore an object of this invention to ameliorate the aforementioned disadvantages and accordingly an electric strike for a door or other movable barrier is disclosed, said strike including a housing with a striker

plate movable therein between a locking position where said plate retains a latch tongue and an unlocked position at which said latch tongue is released, the striker plate having a primary pivoted lever with an outer end engagable with the housing to maintain said locking position and an inner portion of said pivoted lever having a first pin means, a latching lever with second pin means within said striker plate and displaceable by a solenoid between an aligned position at which said first and second pin means abut to hold said pivoted lever in engagement with said housing and one or more offset positions at which said first and second pin means are clear whereby said lever disengages to enable said striker plate to move to said unlocked position.

Preferably the position of said solenoid is adjustable to convert said strike from a Power To Lock mode to a Power To Open mode.

It is further preferred that said striker plate has a lever trip pin which in the Power To Open mode retains said at least one lever in the disengaged position until the open striker plate is pivoted back to the door locking position.

BRIEF DESCRIPTION OF THE DRAWINGS

One currently preferred form of the invention will now be described with reference to the attached drawings in which:

Figures 1 and 2 show cross-sectional views of a striker plate and housing in the locked and unlocked configurations (Power to Open mode).

Figures 3 and 4 show cross-sectional views of the striker plate and housing in the locked and unlocked configurations (Power to Lock mode), and

Figures 5 and 6 show parallel cross-sectional schematic views of the striker plate and housing constructed in accordance with a second embodiment of the invention.

Figure 7 shows a detailed perspective view of one end of a slide block used with the second embodiment,

Figure 8 shows a detailed view of a vertical offset for the locking lever and slide block pin of the second embodiment, and

Figures 9 and 10 show a detailed cross-sectional views along the lines A-A of figure 5.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to figure 1 there is a striker plate 1 which is movable in a striker housing 2 about an axis 3. In accordance with this invention substantially all of the locking mechanism is located within the striker plate. It includes primary and secondary levers 4 and 5 which extend out through the sides of the plate so that end lugs 4A and

5A engage in hooks 6 in the housing. The levers are pivoted at points 4B and 5B near their outer ends to provide maximum mechanical advantage. The inside end 4C of the secondary lever 5 is linked to the primary lever 4 by a pivot pin 7 so that both levers work together. In the latched configuration (Power To Open mode) of figure 1 these levers are shown as horizontal. They are biased to this position by a spring 8. The inside end of the primary lever 4 extends across to engage a latching lever 9. At the inside end of the primary lever 4 a pin 10 is located which projects up towards a solenoid 11. The latching lever 9 is pivoted at 90 degrees to this pin 10 and also itself has a pin 12 protruding down towards the primary lever. With the latching lever in the vertical configuration shown the two pins 10 and 12 abut to hold the primary and secondary levers in the latched position of figure 1. The latching lever 9 together with the solenoid plunger are in turn held to the configuration shown in figure 1 by means of a spring 14 and change over screw 15. This screw (which in the Power to Open mode is fully wound in) defines the position of the solenoid 11 as well as the power off position of the latching lever 9 and solenoid plunger. When power is turned on the solenoid 11 pulls the plunger and latching lever 9 to the right against the bias of spring 14 as shown in figure 2. This moves the pins 10 and 12 out of alignment and allows the inner end of the primary lever 4 to pivot down and raise the lug 4A. The secondary lever 5 pivots in

a similar manner so that the striker plate 1 is thereby released to swing out of the housing 2.

In the Power To Lock mode of figures 3 and 4 the screw 15 is turned fully out. Solenoid 11 then moves to the left under the bias of spring 19 and also resets the power off position of the latching lever 9 and solenoid plunger. As shown in figure 3 the latching lever 9 must now be held in against the bias of spring 14 with the solenoid energised to maintain the blocking alignment of the pins 10 and 12. When power is turned off (figure 4) the latching lever 9 moves to the left under the bias of spring 14 so that the pins 10 and 12 are moved out of alignment and the primary and secondary levers are free to pivot to the unlocked position of figure 4 as the door is opened.

Preferably there is also a spring biased lever trip pin 16 fitted in the striker plate. This engages a tooth 17 on the primary lever to retain it in the disengaged position shown in figure 2. This allows the striker plate to be returned to the locking position in the Power To Open mode whereby the end of the lever trip pin then engages a ramp in the housing which displaces it inward against the spring bias to release the lever to the locking position.

The invention also preferably also includes the novel use of a microswitch 18 to enable monitoring of the lever

positions.

The operating sequence for the two modes is as follows:

POWER TO OPEN (figures 1 and 2)

- the screw 15 is turned fully in to set the strike to the Power To Open mode.
- the striker plate is closed and locked.
- to open the striker plate power is applied to the solenoid 11 which pulls the latching lever pin 10 out of alignment with pin 12 whereby the primary and secondary levers can ride up the retaining hooks 6 in the housing to release the striker plate.
- as the strike clears the housing the lever trip pin 16 is spring biased out to hold the primary lever and linked secondary lever in the unlatched position.
- as the striker plate is subsequently closed the lever trip pin is pushed in to allow the primary and secondary levers to return to the latched positions engaging the hooks 6.

POWER TO LOCK (figures 3 and 4)

- the screw 15 is turned fully out to set the strike to the Power To Lock mode.
- the striker is closed with power applied to the solenoid to maintain locking.
- when power is terminated the latching lever 9 moves

to the left due to the bias of spring 14 and preferably a slight bias of alignment with the two pins 10 and 12 when an opening force is applied and the striker plate releases.

With the second embodiment shown in figures 5 and 6 the plate 18 is pivotally mounted in a U shaped housing 19 similar to the first embodiment. In this case however a single lever 20 pivoted about a central point 21 is fitted in place of the aforementioned primary and secondary levers. The ends of the lever extend through apertures in each side of the striker plate so that bevelled end lugs 21, 22 engage in niches 23, 24 in the striker housing 19. The lever 20 is spring biased to rotate in the clockwise direction as shown. When the striker plate 18 is in the closed position within the housing 19 the left lug 21 is therefore biased upward and the right lug 22 is biased downward into the respective niches. Anticlockwise rotation of the lever 20 to release the striker plate in Power To Open and Power To Lock modes is controlled by a slide block 25. The upper face of this block includes a ramp 26 which engages a roller 27 on the lever 20. The left side of the block as best shown in figure 7 is formed with a central recess 28 and horizontal pin 29. Adjacent the slide block there is a latching lever 30 pivoted about an axis 31. This latching lever 30 comprises a vertical portion which extends down from a pivotal connection with a solenoid

plunger 32 and a horizontal portion which ends in a tooth 33. This tooth, when the lever 20 is in the locked position, abuts the pin 29 to hold the slide block 25 to the right against a spring bias. The roller 27 thereby sits at the top of the ramp 26 and the required anticlockwise rotation of the lever 20 to unlock the striker plate is prevented.

In the Power to Open mode energisation of the solenoid draws the plunger 32 inward and rotates the latching lever 30 clockwise so that tooth 33 moves under the pin 29 and into the recess 28. The block 25 is then free to slide to the left under its spring bias so that the roller 27 descends the ramp 26 and the lever 20 can rotate anticlockwise to the unlocked position.

In the Power To Lock mode the solenoid is repositioned to the left using any suitable adjustment means so that when it is energised and the plunger 32 is withdrawn the tooth then 33 abuts the pin 29 - preferably with a slight upward offset 29A as shown in figure 8. Termination of solenoid power then allows the lever 30 to rotate anticlockwise under its spring bias so that the tooth 33 moves over the pin 29 and into the recess 28. The block 25 is again free to slide to the left as described earlier. Preferably the aforementioned offset as well as the bevelled sides 33A of the tooth assist this anticlockwise rotation of the locking

lever 30 as an opening force is applied to the striker plate.

With this embodiment as best shown in figures 5, 9 and 10 the striker housing preferably also includes recesses 34 which are located behind the lever 20 when in the locked position. During normal operation of the striker plate 18 (figure 9) the lever 20 is held clear of the recesses by leaf springs 35. If an attempt is made to force the striker however the lever 20 is pushed back into the housing against the biase of the leaf springs to seat in the recesses 34 (figure 10). An additional locking action on the lever is then exerted directly by the sides of the recesses so that excessive stress and damage to the striker mechanism is avoided.

The invention also preferably includes the novel use of a microswitch 36 within the striker plate to monitor lever position as with the first embodiment.

It will thus be appreciated that this invention at least in the form of the embodiments disclosed provides a novel and useful improvement in electric strikes. The benefits over currently available strikes include the following:

- one simple solenoid position adjustment enables modification between Power To Open and Power To Lock modes.
- the striker plate can be fitted with either double

or single locking levers.

- the striker plate releases under high side loading.
- the entire release mechanism is contained within the striker aside from the solenoid and locking pin which will not release under side load.
- a unique shroud is preferably fitted to prevent access to wires when the striker plate is opened.

Clearly however the example described is only the currently preferred form of the invention and a wide variety of modifications may be made which would be apparent to a person skilled in the art. For example the shape and configuration of the striker plate as well as the primary, secondary and latching levers may be changed according to design preference.

For the purposes of this specification expressions such as "left", "right", "upward" and "downward" refer to the striker plate and housing in the illustrated position of use and are not to be read as necessarily limiting.

The claims defining the invention are as follows:

1. an electric strike for a door or other movable barrier, said strike including a housing with a striker plate movable therein between a locking position where said plate retains a latch tongue and an unlocked position at which said latch tongue is released, the striker plate having a pivoted lever with an outer end engagable with the housing to obtain said locking position, a latching lever with a shoulder means within said striker plate and displaceable by a solenoid between an aligned position of said shoulder means at which said pivoted lever is held at said locking position and one or more offset positions at which said lever is movable to said unlocked position.
2. The electric strike as claimed in claim 1 wherein said pivoted lever is pivoted in said strike about an intermediate point and the ends of said pivoted lever are engagable in niches in said housing and rotation of said pivoted lever in one direction operates to engage the primary lever ends in said housing and rotation in the opposite direction operates to disengage said pivoted lever ends.
3. The electric strike as claimed in claim 2 wherein said striker plate includes a slide block which is movable between a first location where the upper portion of a ramp

on said block encounters an abutment means on said pivoted lever to hold said pivoted lever in the locking position and a second location where the abutment means is at the bottom of or is clear of the ramp so that the pivoted lever is movable to the unlocked position.

4. The electric strike as claimed in claim 3 wherein the slide block is releasibly held at said first location by said shoulder means blocking movement of said block when the latching lever is in the aligned position.

5. The electric strike as claimed in claim 4 wherein when said strike is in the Power To Open mode the latching lever is biased to said aligned position and powering up of said solenoid moves the latching lever to one of said offset positions against said bias.

6. The electric strike as claimed in claim 5 wherein when said strike is in the Power To Lock mode the latching lever is biased to another of said offset positions and powering up of said solenoid moves said latching lever to said aligned position against said bias.

7. The electric strike as claimed in claim 6 wherein the position of the solenoid is adjustable to convert said strike from the Power To Lock mode to the Power To Open mode.

8. The electric strike as claimed in claim 7 wherein said housing includes one or more recesses into which said pivoted lever is pressed against a spring bias if said strike is forced whereby the sides of said recesses hold said pivoted lever in the locking position.

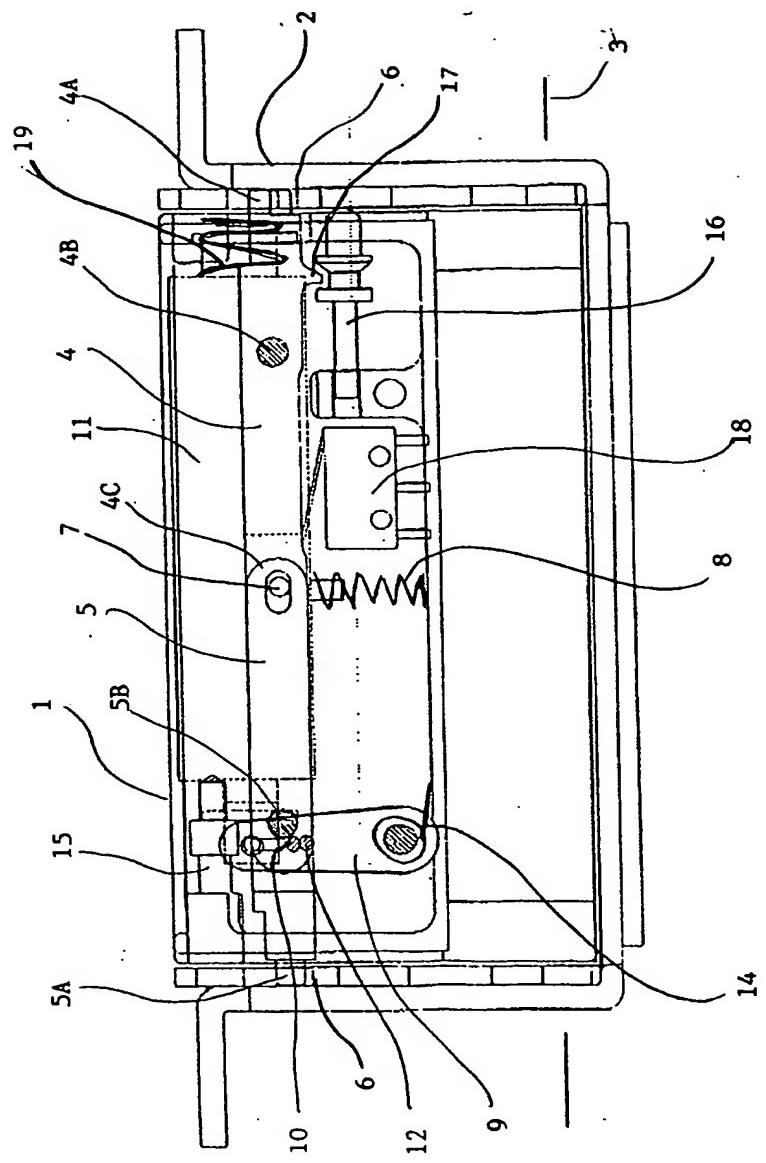
9. The electric strike as claimed in claim 1 wherein the pivoted lever is a primary lever and the strike plate includes a secondary lever with an outer end engagable with said housing, an inside end of said secondary lever being linked to said primary lever by a pivot pin so that said primary and secondary levers move together to engage or disengage with said housing.

10. An electric strike for a door or other movable barrier, said strike being substantially as described herein with reference to figures 1 to 4 or 5 to 10.

Dated this 23rd day of October, 2000

Trimec Technology Pty. Ltd.
By Their Patent Attorney
MICHAEL ANDERSON-TAYLOR

FIGURE 1



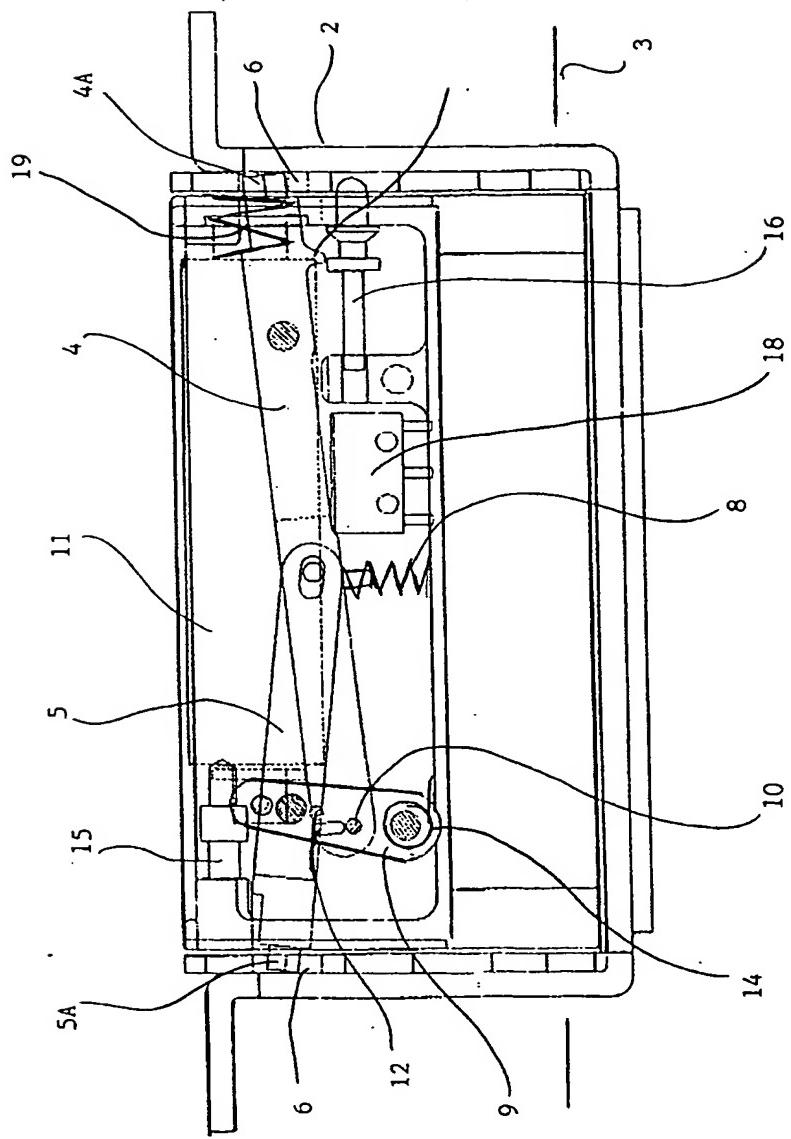


FIGURE 2

33 10 00 0000

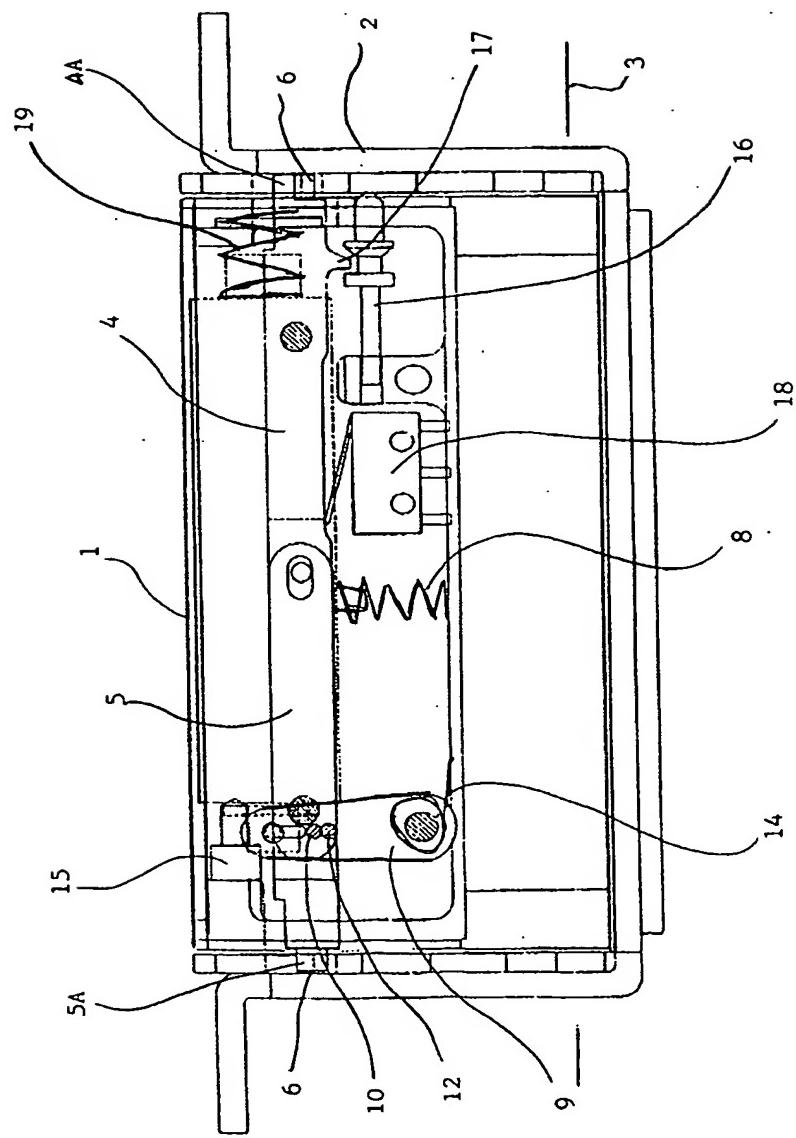


FIGURE 3

33 40 50 587

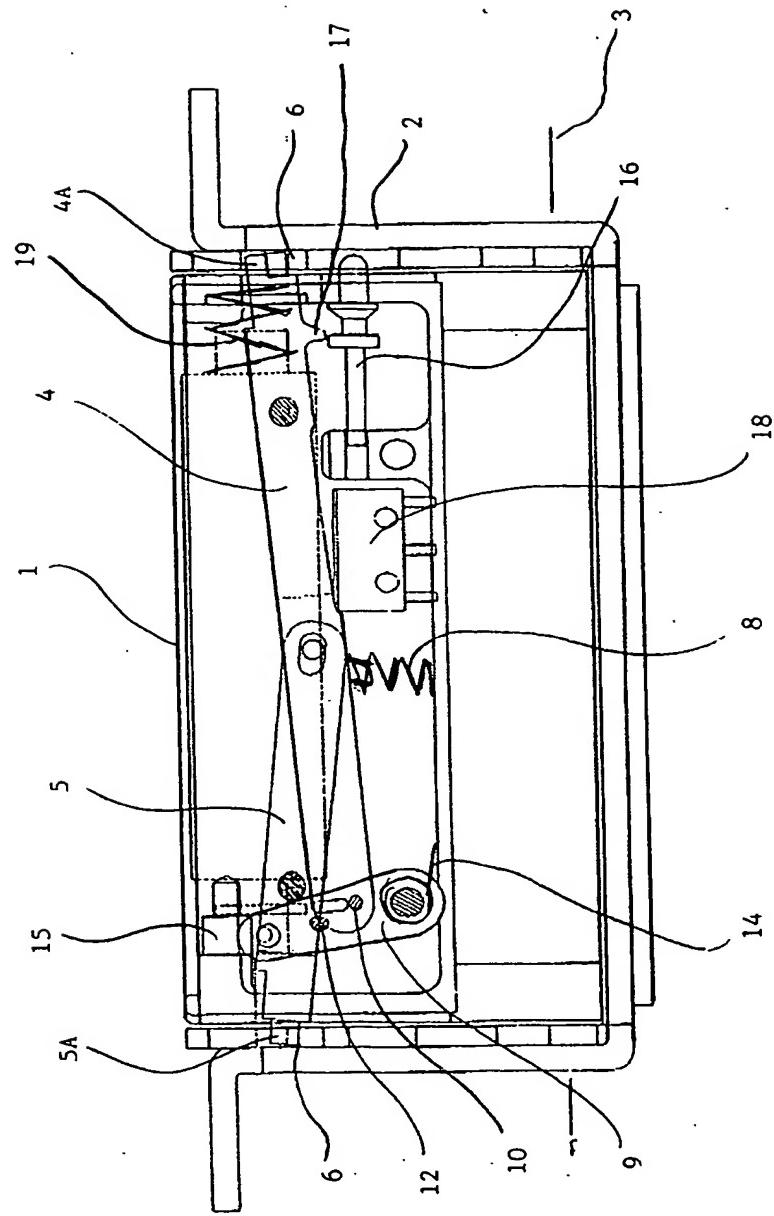


FIGURE 4

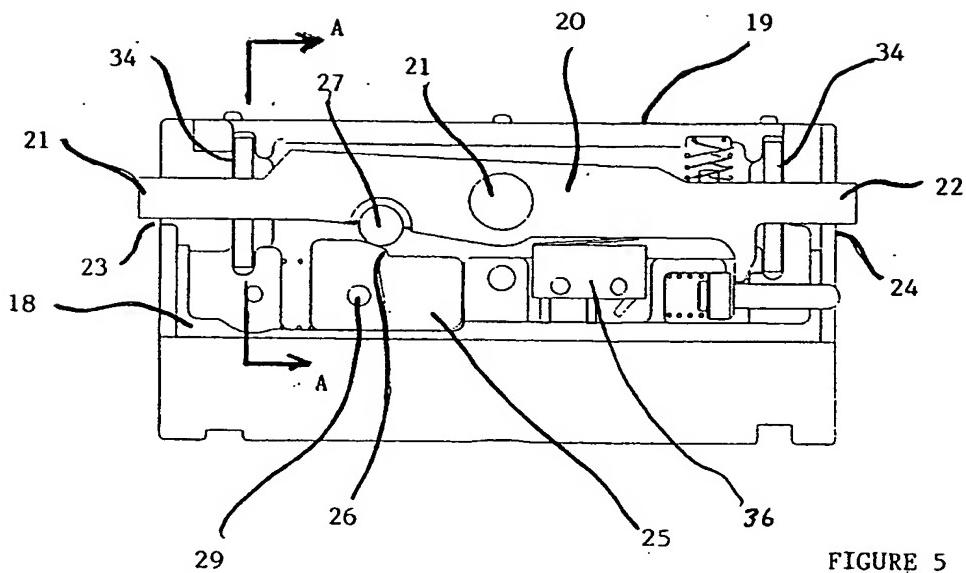


FIGURE 5

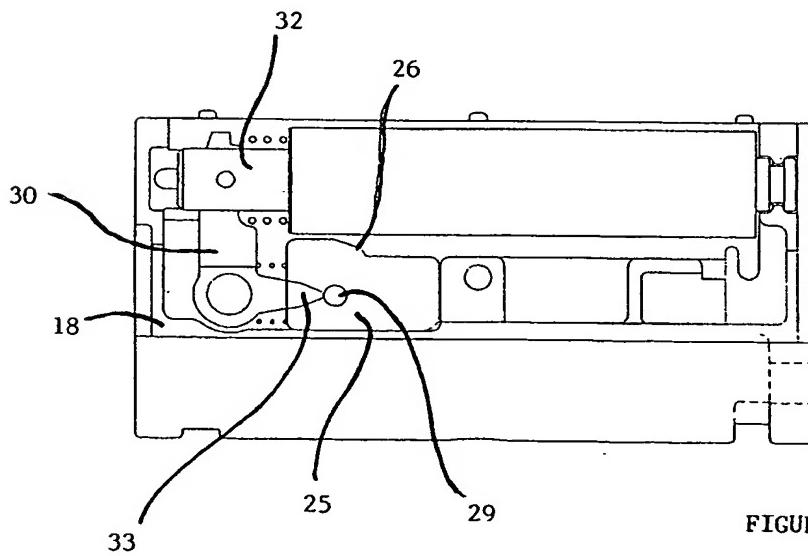


FIGURE 6

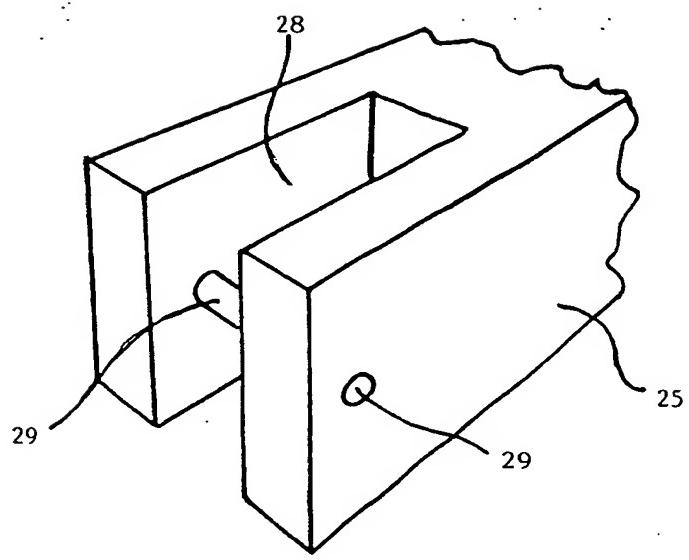


FIGURE 7

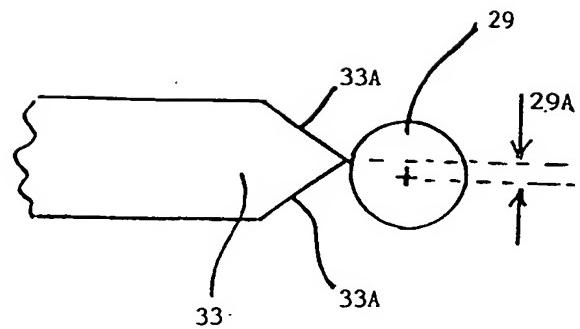


FIGURE 8

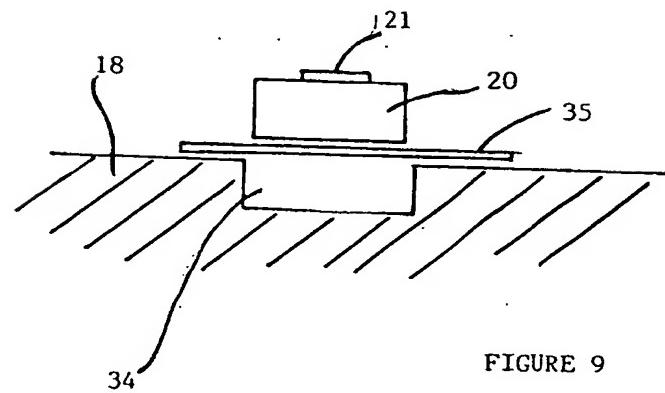


FIGURE 9

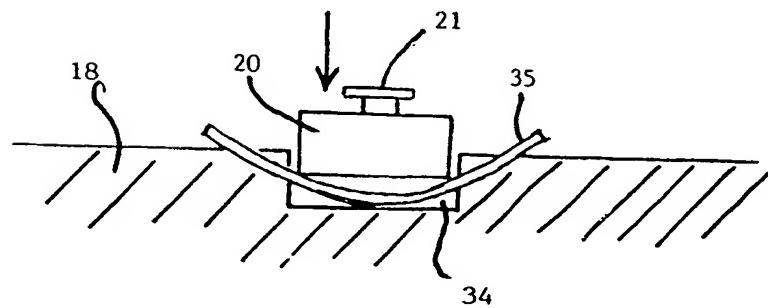


FIGURE 10

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